

Application of Natural Coagulant For Removal of Turbidity From Textile Wastewater

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Abstract- *The wastewater generated by the textile industry is rated as the most polluting among all industrial sectors considering both volumes discharged and effluent composition. Present investigation intended for COD and color removal from textile wastewater using naturally prepared coagulants i.e. Moringa Oleifera. Effect of coagulant dose, flocculation time and temperature has been studied. The Sludge Volume Index (SVI) and turbidity were examined for various effects. After the Jar test it could be found that up to 80% turbidity can remove by Moringaoleifera and it is cheaper than other coagulants.*

I. INTRODUCTION

Turbidity in wastewater is caused by suspended matter, such as clay, silt, finely divided organic and inorganic matter, soluble colored organic compounds, and plankton and other microscopic organisms. Turbid water has muddy or cloudy appearance and it is aesthetically unattractive. The turbidity increases as sewage becomes stronger.

Coagulants neutralise the repulsive electric charge (negative) surrounding particles allowing them to “stick together” creating flocs. Flocculants facilitate the sticking of the coagulated particles to form larger floccules and their by fasten gravitational settling. Coagulation is the destabilisation of colloids by neutralizing the forces that keep them apart. Cationic coagulants provide positive electric charges to reduce the negative charge of the colloids. As a result, the particles colloid to form larger particles (flocks). Rapid mixing is required to disperse the coagulants thorough the liquid.

The enormous use of water in tannery industries has caused a serious problem of drainage of industries has caused a serious problem of drainage of industrial wastewater. Heavy metals are groups of pollutants which are non biodegradable and tend to accumulate in living organisms. Tannery wastewater with high concentration of dissolved solids, suspended solids, chlorides, color, chromium etc., were being discharged every day in the receiving water. Coagulation and flocculation processes are intended to form particles large enough to be separated and removed by subsequent sedimentation, or alternative clarification processes. The

natural coagulants that are locally available have bright future and are concerned by many researchers because of their abundant source, low price, environment friendly, multifunction, and biodegradable nature in water purification.

II. NATURAL COAGULANTS

➤ Moringa olifera

CRUSHEDSEEDS of the tree Moringa oleifera Lam. (M.oleifera) are a viable replacement coagulant for proprietary chemicals such as aluminium sulphate (alum) in developing countries. The tree is a multi-provider that grows pantropically and its uses, global distribution and some vernacular names are given. Results of full scale treatment trials using M.oleifera as the sole coagulant are presented. The study was conducted in February 1994 at the Thyolo treatment works in southern Malawi under the auspices of the Ministry of Works Water Department. The works comprises flocculator-clarifiers, rapid gravity filters followed by chlorination. Imported alum and soda ash are the coagulants normally used on the works. When replaced by M.oleifera seed solution comparable treatment performance was achieved. This is the first time that any naturally derived material has been successfully used as a primary coagulant on such a scale (works flow 60 m³/hour) with the treated water entering supply. Inlet turbidities during the trials ranged between 270 and 380 NTU. Finished water turbidity was consistently below 4 NTU.



Moringa-oleifera

III. METHODOLOGY

➤ Preparation of Natural coagulants

The seed pods Of Moringa Oleifera, CicerArietinum and Tamarind Seed are collected, and dried naturally by sunlight. And remove the seeds from the hulls manually. The dried seeds were ground to fine powder by domestic blender. This powder was sieved through 600µm sieve.

➤ Coagulation – Flocculation process

Jar test is the most widely used experimental methods for coagulation-flocculation. A conventional jar test apparatus was used in the experiments to coagulate sample of turbid water using natural coagulant. It was carried out as a batch test, accommodating a series of six beakers together with six-spindle steel paddles. Before operating the jar test, the sample was mixed homogenously.

➤ Procedure of Coagulation Process:-

- . Take 500ml of sample in each of the 6 beakers.
- Add varying doses of coagulants(natural and chemical) of 0.05 to 5 mg/l in different beakers simultaneously.
- Switch on the motor and adjust the speed of paddles to about 100rpm and rapid mixing is done for 1-2 minutes.
- Reduce the speed of paddles to about 30 to 40 rpm and continue slow mixing for 20 minutes. This corresponds to process of flocculation.
- Switch off the motors and allow it to settle for 20-60 minutes . This corresponds to sedimentation or settling of impurities.
- Collect the supernant from each beaker with the help of pipette, without disturbing the sediment and measure the percentage of turbidity removal using Turbidity meter.
- Turbidity removal corresponding to various doses of natural coagulant measured and the least dose producing maximum removal was designated as optimum coagulant dose. 8.Optimum system pH was found by adding optimum coagulant dose and the pH of the sample was varied from 5 to 9 and the pH value producing maximum turbidity removal (optimum pH) was determined.

IV. RESULTSANDDISCUSSION

- Table no. 1 shows the initial parameter of tannery wastewater.
- By natural coagulation we can reduce up to 90% turbidity as shown in table no.2.

TABLE - 1

SR.NO	CHARACTERISTICS	UNIT	PARAMETERS
1.	Temperature	Centigrade	27.2
2.	Ph	Ph units	7.1
3.	Total Dissolved Solids	Mg/lit	1801
4.	Turbidity	NTU	76
5.	Colour	Hazen unit	Slightly black
6.	Sulpher	Mg/lit	241
7.	Chemical Oxygen Demand	Mg/lit	94
8.	Suspended Solid	Mg/lit	35
9.	Biochemical Oxygen Demand for 5 Days at 20 c	Mg/lit	24

TABLE - 2

SR.NO	VOLUME OF SAMPLE (ml)	DOSAGE (gm/ml)	TURBIDITY READING		REMOVAL OF TURBIDITY (%)
			INITIAL	FINAL	
1.	500	0.2	390	48	87.6
2.	500	0.4	390	36	90.7
3.	500	0.6	390	32	91.7
4.	500	0.8	390	36	90.7
5.	500	1.0	390	40	89.7

V. CONCLUSION

- Moringa oleifera can be used as a natural coagulant/flocculants alternative to the aluminium and other metallic salts.
- It is cheaper than other coagulants.
- Sludge which can generate by this process can be reuse as a agricultural use as well.
- The various factors like coagulant dose, flocculation time and temperature were investigated, in which parameter of coagulant dose is found more preferable than other parameters for the removal of COD. Also, parameters of flocculation time is convenient than other parameters investigated for removal of color.

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